6BCC2538V1 Datasheet & Manual

6BEE Wireless Module
6B_CC2538V1

FCC ID: 2AC5J-6BCC2538V1
IC: 12322A-6BCC2538V1

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The WigWag 6BCC2538V1 module enables organizations to quickly build 6LoWPAN enabled routers, gateways, and most importantly edge devices that interoperate natively with the WigWag platform. The 6BCC2538V1 can also be used with other Zigbee and 802.15.4 protocols and platforms; however, the core focus of this modules is for interoperability with WigWag's DeviceJS enabled products. This module enables edge-device design with a host microcontroller, amplified RF radio link-layer, and certifications for use in product in the United States, Canada, Australia, and the European Union.

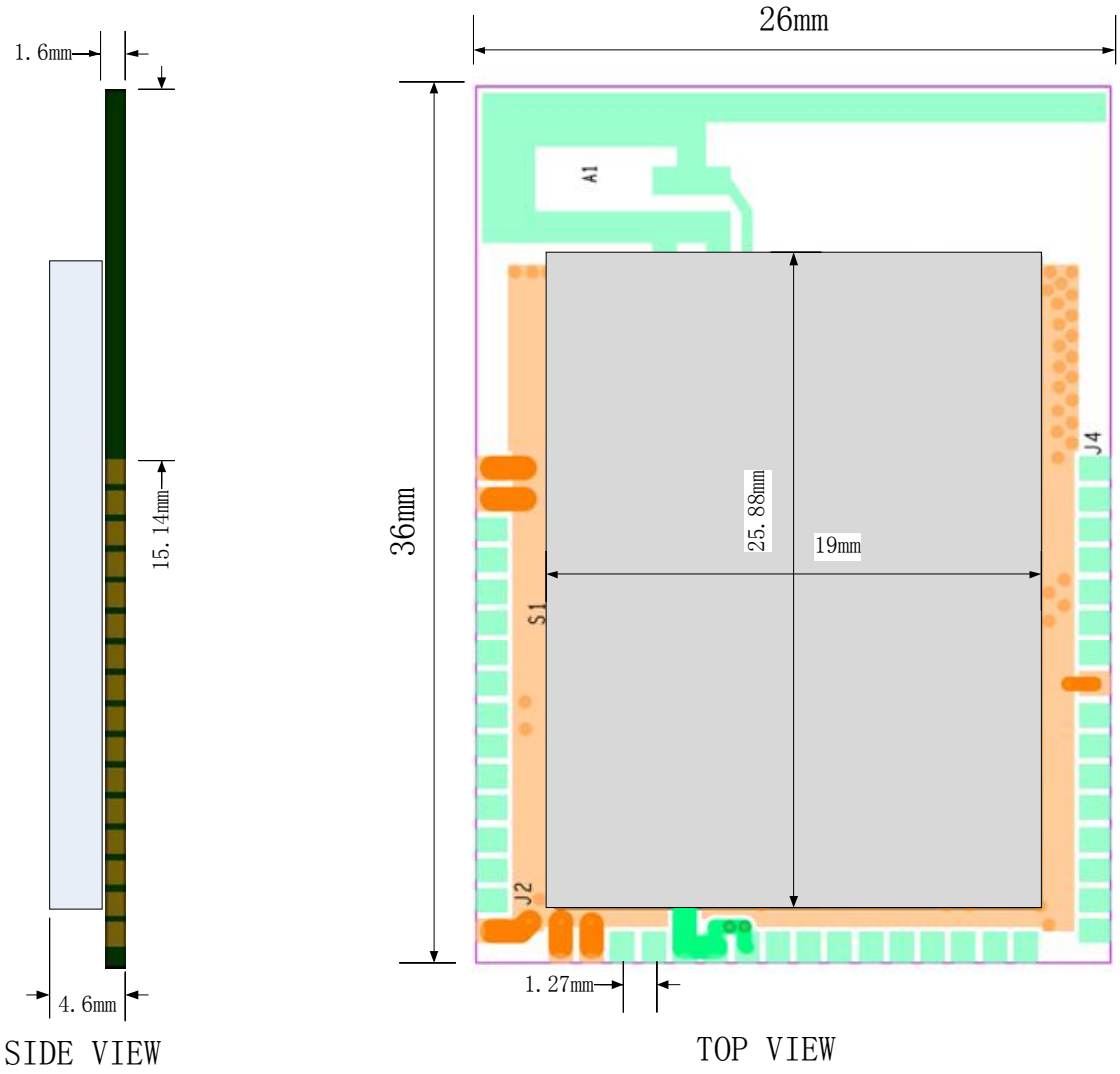
Key Features & Specifications

FEATURES	SPECIFICATIONS
Host Microcontroller ● TEXAS INSTRUMENTS CC2538 combines a powerful ARM Cortex-M3-based MCU system with a robust IEEE 802.15.4 radio ● ISM 2.4 GHz frequency band ● 3.6V - 2.0V operating voltage ● 32MHz, 32KB RAM, 512K Internal Flash **Certifications** ● FCC certification, FCC ID: 2AC5J-6BCC2538V1 ● IC certification, IC: 12322A-6BCC2538V1 **Output** ● 20dBm-0dBm output power via external amplifier and software settings **Boot options** ● Primary internal boot flash ● Secondary boot flash to facilitate robust over-the-air reprogramming **Other features** ● 32.768 kHz real time clock crystal **Formfactor** ● Solderable module ● 32 General purpose I/O pins, 27 with peripheral functions. **Software Support** ● WigWag DeviceJS support ● 6LoWPAN support with the Contiki OS ● Zigbee support with TI SmartRF™ Studio	**Physical Dimensions** ● Length: 36mm (1.4173 in) ● Width: 26mm (1.0236 in) ● Height (z-axis): 4.6mm (.1811 in) **Current consumption** ● Sleep (min/max): 2/150 uA ● Idle (typical): 3 mA ● Transmitting (typical/max) 100/350mA ● Receiving: (typical/max) 100/350mA **Operating Frequency** ● 2405MHz—2483.5MHz,16 channels ● Channel 11: 2405MHz, Channel 12: 2410MHz, (……) Channel 25: 2475MHz, Channel 26: 2480MHz(disable). **RF Characteristics** ● TX Power (min/max): 0dBm/20dBm ● RX sensitivity (min/max): -94dBm/-97dBm ● Range, typical (indoor/outdoor): ~200/~400 ft (60M/120M)

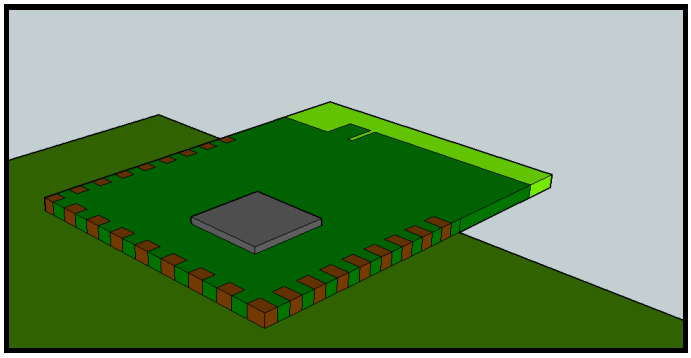
Mechanical drawings

*All dimensional drawings are in mm

Dimensions

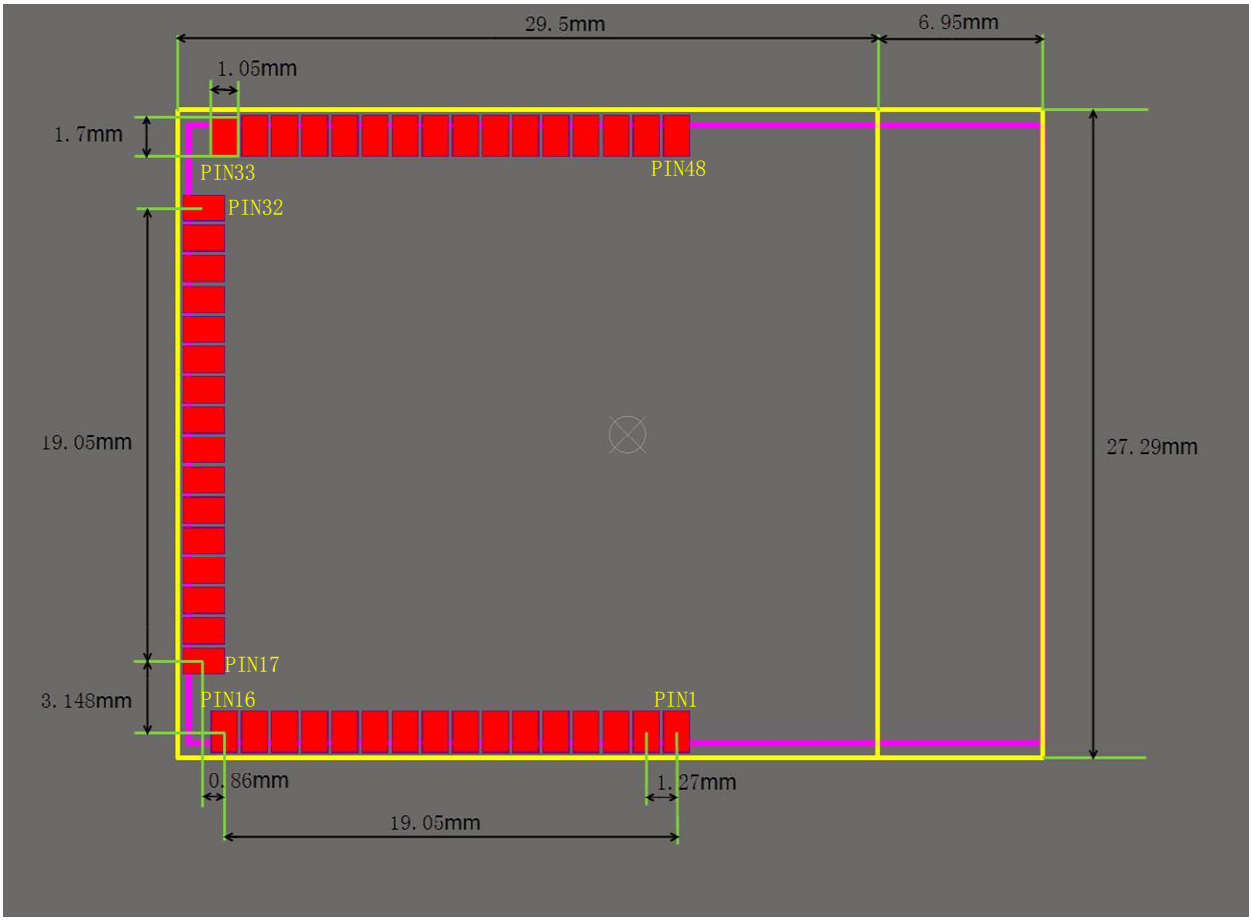


Design consideration: mounting location



RF Caution: The 6BCC538V1 is designed to “hang off” a PCB edge in order to avoid interference from ground planes under the module. Placing this module over batteries, ground plane, components, or tracks within any layer of the main board, or other obstructive material will lessen the capable range of the module. A safe distance is to place these items outside of 20m of the 3 free sides of the antenna. Tracks and components may be placed adjacent to the metal shield, but should not be placed within 20mm of the antenna.

Module PCB Footprint



The module is a “solderable module and therefore the pad dimensions must be followed exactly.
*All dimensions are in mm

IO Port Configuration

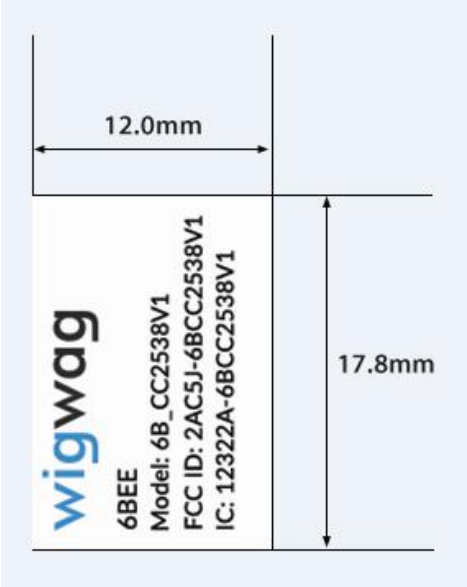
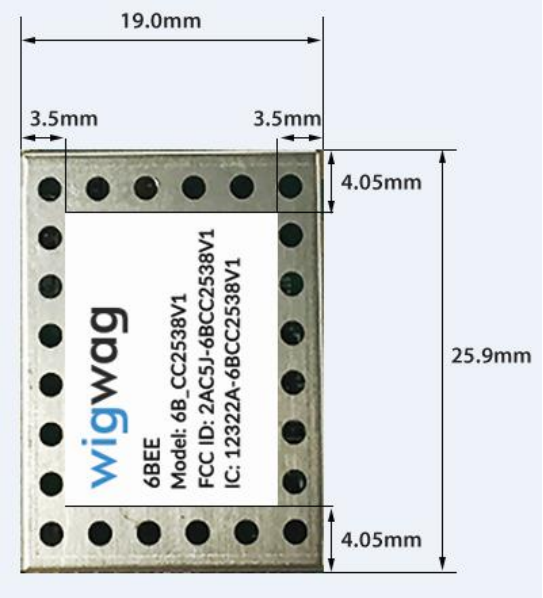
Pin	Location	Name	Description
1	J4_1	PD5	GPIO port D pin 5. Digital I/O
2	J4_2	PD4	GPIO port D pin 4. Digital I/O
3	J4_3	PD3	GPIO port D pin 3. Digital I/O
4	J4_4	nReset	Reset, active-low. Digital input
5	J4_5	NC	NC
6	J4_6	PD1	GPIO port D pin 1. Digital I/O
7	J4_7	PD0	GPIO port D pin 0. Digital I/O
8	J4_8	GND	Ground
9	J4_9	PA7	GPIO port A pin 7. Digital/analog I/O
10	J4_10	PA6	GPIO port A pin 6. Digital/analog I/O
11	J4_11	PA5	GPIO port A pin 5.ROM bootloader SSI TXD. Digital/analog I/O
12	J4_12	PA4	GPIO port A pin 4.ROM bootloader SSI RXD. Digital/analog I/O
13	J4_13	PA3	GPIO port A pin 3.ROM bootloader SSI SEL. Digital/analog I/O
14	J4_14	PA2	GPIO port A pin 2.ROM bootloader SSI CLK. Digital/analog I/O
15	J4_15	PA1	GPIO port A pin 1.ROM bootloader UART TXD. Digital/analog I/O
16	J4_16	PA0	GPIO port A pin 0.ROM bootloader UART RXD. Digital/analog I/O
17	J3_1	PC0	GPIO port C pin 0, 20 mA output capability, no pull-up or pull-down.

			Digital I/O
18	J3_2	PC1	GPIO port C pin 1, 20 mA output capability, no pull-up or pull-down. Digital I/O
19	J3_3	NC	NC
20	J3_4	PC4	GPIO port C pin 4. Digital I/O
21	J3_5	PC5	GPIO port C pin 5. Digital I/O
22	J3_6	PC6	GPIO port C pin 6. Digital I/O
23	J3_7	PC7	GPIO port C pin 7. Digital I/O
24	J3_8	PB0	GPIO port B pin 0. Digital I/O
25	J3_9	NC	NC
26	J3_10	DVDD_USB	3.3-V USB power-supply connection
27	J3_11	DVDD_USB	3.3-V USB power-supply connection
28	J3_12	DVDD_USB	3.3-V USB power-supply connection
29	J3_13	USB_N	USB differential data minus (D–). USB I/O
30	J3_14	USB_P	USB differential data plus (D+). USB I/O
31	J3_15	GND	Ground
32	J3_16	GND	Ground
33	J2_1	GND	Ground
34	J2_2	NC	NC
35	J2_3	PB1	GPIO port B pin 1. Digital I/O
36	J2_4	PB2	GPIO port B pin 2. Digital I/O
37	J2_5	PB3	GPIO port B pin 3. Digital I/O

38	J2_6	PB4	GPIO port B pin 4. Digital I/O
39	J2_7	PB5	GPIO port B pin 5. Digital I/O
40	J2_8	NC	NC
41	J2_9	PB6/JTAG_TDI	GPIO port B pin 6,TDI(JTAG). Digital I/O
42	J2_10	PB7/JTAG_TDO	GPIO port B pin 7,TDO(JTAG). Digital I/O
43	J2_11	JTAG_TCK	JTAG TCK. Digital I/O
44	J2_12	JTAG_TMS	JTAG TMS. Digital I/O
45	J2_13	NC	NC
46	J2_14	NC	NC
47	J2_15	GND	Ground
48	J2_16	GND	Ground

Ordering Information

Simple SKU ordering: 6B_CC2538V1-001

Label dimensions	Label positioning on shield
	

Label location on module

Regulatory and Certifications

FCC Statement:

This equipment has been tested and found to comply with the limits for Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.
However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: Modifications to this product will void the user's authority to operate this equipment.

RF Radiation Exposure Statement:

1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

2. This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

FCC Information to OEM integrator
The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user manual of the end product.
The user manual which is provided by OEM integrators for end users must include the following information in a prominent location.

1. To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures.

2. Only those antennas with same type and lesser gain filed under this FCC ID number can be used with this device.

3. The regulatory label on the final system must include the statement: “Contains FCC ID: xxxx or using electronic labeling method as documented in KDB 784748.
4. The final system integrator must ensure there is no instruction provided in the user manual or customer documentation indicating how to install or remove the transmitter module except such device has implemented two-ways authentication between module and the host system

IC Statement:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device."

IC Déclaration:

En vertu de la réglementation de l'industrie du Canada, cet émetteur de radio ne peuvent fonctionner en utilisant une antenne d'un type et maximum (ou moins) Gain approuvé pour l'émetteur par Industrie Canada. pour réduire risque d'interférence aux autres utilisateurs, le type d'antenne et son gain doivent être choisis de sorte que la puissance isotrope rayonnée équivalente (PIRE) ne dépasse pas ce qui est nécessaire pour la réussite de communication.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Remarque: Toute modification de ce produit annule l'autorité de l'utilisateur à utiliser cet équipement.

RF Radiation Exposure Statement:

1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

2. This equipment complies with IC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

IC Information to OEM integrator

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user manual of the end product.
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1. To comply with IC RF exposure compliance requirements, the antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be

co-located or operating in conjunction with any other antenna or transmitter, except in accordance with IC multi-transmitter product procedures.

2. Only those antennas with same type and lesser gain filed under this IC number can be used with this device.

3. The regulatory label on the final system must include the statement: “Contains IC: xxxx “.

4. The final system integrator must ensure there is no instruction provided in the user manual or customer documentation indicating how to install or remove the transmitter module except such device has implemented two-ways authentication between module and the host system.